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Establishment of an in-use testing method for evaluating disinfection of surgical instruments using the duck hepatitis B model.

Deva AK, Vickery K, Zou J, West RH, Harris JP, Cossart YE.

Department of Surgery, Royal Prince Alfred Hospital, Australia.

Nosocomial transmission of hepatitis B virus (HBV), associated with interventional procedures, has been attributed to its survival on improperly decontaminated instruments. To date, guidelines for chemical disinfection of potentially contaminated heat-sensitive instruments have been based largely on extrapolation of data from in-vitro disinfectant testing. Direct infectivity testing has not been possible for HBV because of the lack of a practical culture assay or susceptible experimental animal model. In this study the related duck hepatitis B virus was used to simulate in-vivo transmission of a HBV during surgery, and to evaluate the effectiveness of 2% glutaraldehyde disinfection of surgical laparoscopes. Multiple laparoscopic liver biopsies were performed on 'biohazardous' duck hepatitis B (DHBV) positive ducks. Laparoscopes were then subjected to different disinfection regimes using 2% glutaraldehyde, and residual infectivity tested by placing their tips into the peritoneal cavities of uninfected four-day-old ducklings. Direct transmission of DHBV occurred in all ducks when laparoscopes were not washed. Rinsing with water lowered the transmission rate to 64% and no infection transmission occurred after 5 min of contact time with the disinfectant. In contrast, previous in-vitro studies had shown complete viral inactivation after a shorter period of disinfection. It is postulated that the longer inactivation time observed in our study may be a result of surface interactions of virus and instrument, interfering with disinfectant access or activity. Tests of instrument surface samples for viral DNA by the polymerase chain reaction (PCR) did not correlate with transmission of virus infection in vivo. PCR is an inappropriate test for evaluating the efficacy of disinfectant action despite its sensitivity. This in use method will allow testing of other decontamination procedures and their effectiveness on more complex surgical instruments.

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